TRC
Environmental Solutions through Technology

TRC Environmental Corporation
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RECD 12-2-93
F.B.

November 29, 1993

Ms. Margaret Leshen, Chief
Contracts Management Section
U. S. Environmental Protection Agency
JFK Federal Building
Boston, MA 02203-2211

Reference: Contract No. 68-W9-0003 TES-6
Work Assignment No. R01005
Ciba-Geigy
Corrective Action Oversight
(Ref. 1-635-058)

Subject: Deliverable: Data Validation Report
Case #: 20682, SDG: MACZ46
CLP Lab: Chemtech Consulting Group
Metals: 9/Water

Dear Ms. Leshen:

In accordance with the reporting requirements of the referenced Work Assignment, enclosed is the Data Validation Report for case #20682, which was generated by Dynamac Corporation, TRC's Data Validation Subcontractor for this Work Assignment. The validation was performed on analytical data from low level water samples collected by TRC Environmental Corporation at the Ciba-Geigy site on August 24, 1993 and analyzed by Chemtech Consulting Group.

If you have any questions, please feel free to contact Cynthia Fortin, TRC's Data Validation Coordinator, at (508) 970-5757 extension 5265.

Sincerely yours,

William J. Farino
Regional Manager

WJF/efg
Enclosures

cc: Deborah Szaro/Moira Lataille/EPA Region I CLP TPO
Kathy Castagna/EPA Regional Project Officer (letter only)
Frank Battaglia/EPA Work Assignment Manager (letter only)
Joanna Hall/TRC Project Manager
Edward MacKinnon/TRC Lead Chemist
Laboratory Regional CLP TPO

DYNAMAC
CORPORATION
Environmental Services

November 11, 1993

Ms. Cynthia Fortin
Data Validation Coordinator
TRC Corporation
Boott Mills South, Foot of John Street
Lowell, Massachusetts 01852

Re: Contract No: 68-W9-0003
Work Assignment No. R01005
Case No. 20682, SDG No. MACZ46
Site Name : Ciba-Geigy
Chemtech Consulting Group
Metals: 9/WATER
Validation: Tier II

Dear Ms. Fortin:

A validation was performed on 9 low level water samples, which were collected by TRC Environmental Corporation at the Ciba-Geigy site and submitted to Chemtech Consulting Group for total metal and cyanide analysis. The sample set contained two performance evaluation samples; no data qualifiers were applied to these samples. The samples were analyzed according to the USEPA Contract Laboratory Program Statement of Work (SOW) for Inorganic Analysis, ILM03.0. The data were evaluated based on the following parameters according to the Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, February 1989:

*	• data completeness
*	• holding times
	• calibration verification
	• laboratory and field blank analysis
*	• ICP interference check sample results
*	• matrix spike recoveries
	• laboratory and field duplicates
*	• laboratory control sample results
	• furnace atomic absorption results
	• serial dilution results
*	• detection limit results
*	• sample results

* All criteria were met for this parameter.

Table I summarizes the validation recommendations, which were based on the following information:

Calibration Verification

The 2xCRDL standards for beryllium, manganese, and silver were outside the control limits. Estimate (J) positive results <3xCRDL and (UJ) non-detected results since results near the CRDL may be biased high for manganese and silver while the results for beryllium may be biased low.

Laboratory and Field Blank Analysis

The following analytes were detected above the instrument detection limit (IDL) in the laboratory and/or field blanks:

Matrix: Water

Analyte	Max. Conc. (ug/L)	Action Level (ug/L)
chromium	8.4	42
copper	22	110
iron	-59.150	(see below)
sodium	-696.2	(see below)
zinc	7.1	35.5

Value > IDL and < Action Level; remove the value from the analytical table and report the action level on the detection limit table.

Value > IDL and > Action Level; report the value unqualified on the analytical table.

For negative blank results, estimate all values < 5xIDL (J) and all non-detected results.

Laboratory Duplicate Analysis

Estimate positive aluminum and iron results in all samples due to poor laboratory duplicate precision.

Furnace Atomic Absorption Analysis

The following samples and analytes analyzed by graphite furnace atomic absorption had post digestion spike recoveries outside the QC limits:

Analyte	Sample(s) Affected (Percent Recovery)
arsenic	MACZ48 (118.8%), MACZ49 (134.5%), MACZ52 (84.0%)
selenium	MACZ46 (60.0%), MACZ50 (32.5%), MACZ52 (58.0%)
thallium	MACZ46 (63.5%), MACZ47 (77.0%), MACZ49 (64.0%), MACZ50 (82.5%), MACZ51 (74.0%), MACZ52 (120.5%)

Estimate (J) positive and (UJ) non-detected sample results for arsenic in sample MACZ52, for selenium in samples MACZ46, MACZ50, and MACZ52, and for thallium in samples MACZ46, MACZ47, MACZ49, MACZ50, and MACZ51 due to low post digestion spike recoveries.

Estimate (J) positive sample results for arsenic in samples MACZ48 and MACZ49 and for thallium in sample MACZ52 due to high post digestion spike recoveries.

ICP Serial Dilution

Estimate positive sodium results in all samples due to poor serial dilution analysis duplication.

Performance Evaluation Sample Scores

For sample MACZ53 (total metal analysis), the results for aluminum, calcium, cobalt, iron, magnesium, nickel, potassium, sodium, thallium, and zinc were within windows. The results for copper were low (action) and the results for selenium were low (warning). In addition, arsenic, which was not present in the sample, was detected.

For samples MACZ55 (cyanide analysis), the results for cyanide were high (action).

Summary

Overall the data were accepted.

Sincerely,

James L. Platt, Jr.
Manager, Compliance Services
Dynamac Corporation

Kelly Luck
Senior Data Reviewer
Dynamac Corporation

The signature below indicates that this data validation package has been reviewed and approved by TRC Environmental Corporation and that TRC Environmental Corporation accepts responsibility for this data validation package.

Cynthia Fortin
Data Validation Coordinator
TRC Environmental Corporation

Enclosures: Data Validation Worksheets
Sample Results Summary Tables (hardcopy)
Sample Results Summary Tables (diskette)
Regional Data Assessment Form
Data Package - Case No. 20682, SDG No. MACZ46

Case No. 20682/SDG No. MACZ46
Table I. Recommendation Summary

Aluminum	J[1]	Magnesium	A
Antimony	A	Manganese	A
Arsenic	J[2],J[3]	Mercury	A
Barium	A	Nickel	A
Beryllium	J[4]	Potassium	A
Cadmium	A	Selenium	J[5]
Calcium	A	Silver	J[4]
Chromium	A[1]	Sodium	J[6]
Cobalt	A	Thallium	J[7],J[8]
Copper	A[1]	Vanadium	A
Iron	J[1]	Zinc	A[1]
Lead	A	Cyanide	A

A - Accept all data.

A[1] - Accept data; raise detection limits due to blank contamination.

J[1] - Estimate (J) positive results in all samples due to poor laboratory duplicate precision.

J[2] - Estimate (J) positive results in samples MACZ48 and MACZ49 due to high post digestion spike recoveries.

J[3] - Estimate (J) positive results and (UJ) non-detected results in sample MACZ52 due to poor post digestion spike recovery.

J[4] - Estimate (J) positive results <3xCRDL and (UJ) non-detected results in all samples due to CRDL standard results outside the control windows.Estimate (J) positive and (UJ) non-detected results in samples MADA26 through MADA31 due to poor post digestion spike recoveries.

J[5] - Estimate (J) positive results and (UJ) non-detected results in samples MACZ46, MACZ50, and MACZ52 due to poor post digestion spike recoveries.

J[6] - Estimate (J) positive results in all samples due to poor serial dilution results.

J^7 - Estimate (J) positive results and (UJ) non-detected results in samples MACZ46, MACZ47, MACZ49, MACZ50, and MACZ51 due to poor post digestion spike recoveries.

J^8 - Estimate (J) positive results in sample MACZ52 due to high post digestion spike recovery.

DPO: [ ] ACTION [M] FYI

Region I

INORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO. 20682 LABORATORY CHEM

SDG NO. MAC246 DATA USER TRC Corporation

SOW ILM03.0 REVIEW COMPLETION DATE 11/11/93

NO. OF SAMPLES 9 MATRIX Water

REVIEWER [ ] ESD [ ] ESAT [X] OTHER, CONTRACT/CONTRACTOR Dynamac

	ICP	AA	Hg	CYANIDE
1. HOLDING TIMES	O	O	O	O
2. INITIAL CALIBRATIONS	X[1]	O	O	O
3. CONTINUING CALIBRATIONS	O	O	O	O
4. FIELD BLANKS ("F" = not applicable)	O	O	O	O
5. LABORATORY BLANKS	X[2]	O	O	O
6. ICS	O			
7. LCS	O	O		
8. DUPLICATE ANALYSIS	X[3]	O	O	O
9. MATRIX SPIKE	O	O	O	O
10. MSA		O		
11. SERIAL DILUTION	X[4]			
12. SAMPLE VERIFICATION	O	O	O	O
13. REGIONAL QC ("F" = not applicable)	O	O	O	O
14. OVERALL ASSESSMENT	M	X O (L4L)	O	O

O = No problems or minor problems that do not affect data usability.
X = No more than *about* 5% of the data points are qualified as either estimated or unusable.
M = More than *about* 5% of the data points are qualified as estimated.
Z = More than *about* 5% of the data points are qualified as unusable.
A = DPO action requested; use in conjunction with one of the above codes.

DPO ACTION ITEMS:

AREAS OF CONCERN: X[1] - 2x CRDL stds outside QC limits for Be, Mn, Ag; X[2] - negative blank results for Fe and Na; X[3] - poor laboratory duplicate precision for Al and Fe; X[4] - poor serial dilution results for Na.

REGION I
Data Review Worksheets

Site Name Ciba-Geigy
Reference Number_____

REGION I REVIEW OF INORGANIC CONTRACT LABORATORY DATA PACKAGE

The hardcopied (laboratory name) *CHEMTECH* data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Case No.:	*20682*	SAS No.:	--	Sampling Date(s):	*08/24/93*
SDG No.:	*MACZ46*	Matrix:	*water*	Shipping Date(s):	*08/25/93*
No. of Samples:	*9*			Date Rec'd by Lab:	*08/26/93*

Traffic Report Nos: *MACZ46, MACZ47, MACZ48, MACZ49, MACZ50, MACZ51, MACZ52, MACZ53, MACZ55*

Trip Blank No.: --

Equipment Blank No.: *MACZ52*

Field Dup Nos: *MACZ47, MACZ48*

PE Samples: *MACZ53, MACZ55*

SOW No. *ILM 03.0* requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- -Data Completeness
- -Holding Times
- -Calibrations
- -Blanks
- -ICP Interference Check Results
- -Matrix Spike Recoveries
- -Laboratory Duplicates
- -Field Duplicates
- -Lab Control Sample Results
- -Furnace AA Results
- -ICP Serial Dilution Results
- -Detection Limit Results
- -Sample Quantitation

Overall Comments: *This package was evaluated at the TIER II validation level.*

Definitions and Qualifiers:

J - Approximate data due to quality control criteria.
R - Reject data due to quality control criteria.

Reviewer: Kelly Luck / Maggie Kaggwa Date: 11/11/93

REGION I
Data Review Worksheet

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATA RECEIVED

REGION I
Data Review Worksheet

II. HOLDING TIMES Complete table for all samples and circle the analysis data for samples not within criteria.

SAMPLE ID	DATE SAMPLED	HG ANALYSIS DATE	CYANIDE ANALYSIS DATE	OTHERS ANALYSIS DATE	pH	ACTION
MACZ46	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	
MACZ47	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	
MACZ48	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	
MACZ49	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	
MACZ50	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	
MACZ51	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	
MACZ52	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	
MACZ53	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	
MACZ55	*08/24/93*	*09/13/93 (20)*	*09/04/93 (11)*	*09/26/93 (33)*	*<2*	

METALS - 120 DAYS FROM SAMPLE COLLECTION
MERCURY - 28 DAYS FROM SAMPLE COLLECTION
CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTIONS: *None; all criteria were met.*

Action: 1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).
2. If holding times are grossly exceeded (>2x), all results are qualified unusable (R).

REGION I
Data Review Worksheet

III A. INSTRUMENT CALIBRATION (Section 1)

1. Recovery Criteria

List the analytes which did not meet the percent recovery (%R) criteria for Initial or Continuing Calibration.

DATE	ICV/CCV#	ANALYTE	%R	ACTION	SAMPLES AFFECTED

ACTIONS: *None; all criteria were met.*

If any analyte does not meet the %R criteria follow the actions stated below:

Positive Results	Nondetected Results	%R		
		Metals	CN	Mercury
J	UJ	75-89	70-84	65-79
J	R	<75	<70	<65
J		110-125	116-130	121-135
	R	>125	>130	>135

REGION I
Data Review Worksheet

III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

A. Did the laboratory use the proper number of standards for calibration as described in the SOW? *Yes*

B. Were calibrations performed at the beginning of each analysis? *Yes*

C. Were calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent? *Yes*

D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN $\geq$ 0.995? *N/A (TIER II)*

E. Was a standard at 2xCRDL analyzed for all ICP analyses? *Yes*

2xCRDL standards exceeded the $\pm$20% criteria for the following elements: Be (R_1 = 122.7%; R_2 = 78.5%), Mn (R_1 = 114.9%), and Ag (R_2 = 141.0%).

ACTIONS: *J(<3xCRDL); UJ(ND) in all samples for Be, Mn, and Ag.*

Action: 1. If the minimum number of standards were not used for initial calibration or if the instrument was not calibrated daily an each time the instrument was set up, qualify the data as unusable (R).

2. If the correlation coefficient is <0.995,qualify results >IDL as estimated (J), and results <IDL as estimated (UJ).

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Section 1)

List the blank contamination in Section 1 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks MATRIX: *water*

Note: Negative blanks whose absolute value was <2xIDL were not included.

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC/UNITS
	CCB1		*Cr*	*6.4 ug/L*
	CCB2		*Cr*	*8.4 ug/L*
	CCB4		*Cu*	*22 ug/L*
		PBW	*Fe*	*-59.150 ug/L*
	CCB1		*Fe*	*52.6 ug/L*
	CCB3		*Fe*	*-45.5 ug/L*
	CCB4		*Fe*	*-53.6 ug/L*
	CCB5		*Fe*	*-55.1 ug/L*
	CCB6		*Fe*	*-49.8 ug/L*
	CCB7		*Fe*	*-51.8 ug/L*
		PBW	*Na*	*-696.020 ug/L*
	CCB3		*Na*	*-652.6 ug/L*
	CCB4		*Na*	*-667.4 ug/L*
	CCB5		*Na*	*-681.1 ug/L*
	CCB6		*Na*	*-662.0 ug/L*
	CCB7		*Na*	*-650.6 ug/L*
	CCB1		*Zn*	*7.1 ug/L*
	CCB2		*Zn*	*6.9 ug/L*

Note that samples were analyzed for Fe between CCB4 and CCB7.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Section 2)

List the blank contamination in Section 2 below. A separate worksheet should be used for soil and water blanks.

2. Equipment/Trip Blanks

No analytes were detected in the field blank (MACZ52).

DATE	EQUIP BL	ANALYTE	CONC/UNITS

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Section 3)

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? *Yes*

B. Was a calibration blank run every 10 samples of every 2 hours whichever is more frequent? *Yes*

If no, the data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

_____

_____

_____

REGION I
Data Review Worksheet

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated of diluted should be multiplied by the concentration/dilution factor. No positive sample results should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.

2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: *water*		
ELEMENT	MAX. CONC./UNITS	AL/UNITS
Cr	*8.4 ug/L*	*42 ug/L*
Cu	*22 ug/L*	*110 ug/L*
Fe	*-59.150 ug/L*	*J(<5xIDL);UJ(ND)*
Na	*-696.2 ug/L*	*J(<5xIDL);UJ(ND)*
Zn	*7.1 ug/L*	*35.5 ug/L*

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

$$\text{Conc. in } \mu g/L \times \frac{\text{volume diluted to (200 mL)}}{\text{weight digested (1 g)}} \times \frac{1\text{ L}}{1000\text{ mL}} \times \frac{1000\text{ g}}{1\text{ kg}} \times \frac{1\text{ mg}}{1000\ \mu g} \times \frac{1}{\%\text{ solids}} = \text{mg/kg}$$

ACTIONS: *The following samples were qualified with a U: Cu in MACZ47, MACZ48, MACZ50, MACZ51; Cr in MACZ47, MACZ48, MACZ51; Zn in MACZ49.*

REGION I
Data Review Worksheet

V A. ICP INTERFERENCE CHECK SAMPLE (Section 1 & 2)

List any elements in the ICS AB solution which did not meet the criteria for %R.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED

ACTIONS: *None; all criteria were met.*

If an element does not meet the %R criteria, follow the actions stated below:

%R	Positive results	Nondetected results
<50%	R	R
50-79%	J	UJ
>120%	J	

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each sample analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent?

Yes

If no, the data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

_____

_____

_____

REGION I
Data Review Worksheet

V B. ICP INTERFERENCE CHECK SAMPLE (Section 3)

3. Report the concentration of any elements detected in the ICS A solution >2xIDL that should not be present.

ELEMENT	CONC. DETECTED IN THE ICS		CONC. OF THE INTERFERENTS IN THE ICS			
	Initial	Final	Al	Ca	Fe	Mg
Cd	*-23*	*-17*	*514927*	*529351*	*190348*	*543610*
Co	*-17*	*-18*	*514927*	*529351*	*190348*	*543610*
Ag	*-14*	*12*	*514927*	*529351*	*190348*	*543610*
Na	*801*	*190*	*514927*	*529351*	*190348*	*543610*
Zn	*71*	*62*	*514927*	*529351*	*190348*	*543610*

Estimate the concentration produced by the interfering element in all affected samples. See guidelines for examples. List the samples affected by interferences below:

SAMPLE AFFECTED	ELEMENT AFFECTED	SAMPLE CONC. (µg/L)	SAMPLE INTERFERENT CONC.				ESTIMATED INTERF. (µg/L)
			Al	Ca	Fe	Mg	

ACTIONS: *None; see 1.*

1. In general, the sample data can be accepted without qualification if the sample concentrations of Al, Ca, Fe, and Mg are less than or equal to their respective levels in the ICS solution.

Give explanation for any action taken below:

_____

_____

_____

_____

REGION I
Data Review Worksheet

VI. MATRIX SPIKE

TR # *MACZ49* MATRIX: *water*

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spiked sample result
SR - sample result

ANALYTE	SSR	SR	S	%R	ACTION

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS: *None; all criteria were met.*

1. If the sample concentration exceeds the spike concentration by a factor of 4 of more, no action is taken.

2. If any analyte does not meet the %R criteria, follow the actions stated below:

%R	Positive results	Nondetected results
<30%	J	R
30-74%	J	UJ
>125%	J	

2. Frequency Criteria

A. Was a matrix spike prepared at the required frequency? *Yes*

B. Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery? *Yes*

A separate worksheet should be used for each matrix spike pair.

REGION I
Data Review Worksheet

VII. LABORATORY DUPLICATES

List the concentrations of any analyte not meeting the criteria for duplicate precision. For soil duplicates, calculate the CRDL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria were used to evaluate precision be circling either the RPD or CRDL for each element.

MATRIX: *water*

ELEMENT	CRDL water (µg/L)	CRDL soil (mg/kg)	SAMPLE # *MACZ49*	DUPLICATE # *MACZ49D*	RPD	ACTION
Aluminum	200		*848.8*	*1173.6*	*32.1*	*J(+)*
Antimony	60					
Arsenic	10					
Barium	200					
Beryllium	5					
Cadmium	5					
Calcium	5000					
Chromium	10					
Cobalt	50					
Copper	25					
Iron	100		*1863*	*2485.4*	*28.6*	*J(+)*
Lead	5					
Magnesium	5000					
Manganese	15					
Mercury	0.2					
Nickel	40					
Potassium	5000					
Selenium	5					
Silver	10					
Sodium	5000					
Thallium	10					
Vanadium	50					
Zinc	20					
Cyanide	10					

Laboratory Duplicate Actions should be applied to all other samples of the same matrix type.

ACTIONS: *See Action column above.*

1. Estimate (J) positive results for elements which have an RPD >20% for water samples and >35% for soil samples, when sample results are >5xCRDL.
2. If sample results are less than 5xCRDL, estimate (J) positive results for elements whose absolute difference is >CRDL (2xCRDL for soil samples). If both samples are non-detected, the RPD is not calculated (NC).

REGION I
Data Review Worksheet

VIII. FIELD DUPLICATES

List the concentrations of all analytes in the field duplicate pair. For soil duplicates, calculate the CRDL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria were used to evaluate precision be circling either the RPD or CRDL for each element.

MATRIX: *water*

ELEMENT	CRDL		SAMPLE # *MACZ47*	DUPLICATE # *MACZ48*	RPD	ACTION
	water (µg/L)	soil (mg/kg)				
Aluminum	200		*18500*	*19900*	*7.3*	
Antimony	60					
Arsenic	10		*16.8*	*11.7*	*35.8*	
Barium	200		*50.0*	*50.0*	*0*	
Beryllium	5					
Cadmium	5					
Calcium	5000		*18800*	*20200*	*7.2*	
Chromium	10		*28.2*	*24.9*	*12.4*	
Cobalt	50		*12.2*	*9.9*	*20.8*	
Copper	25		*89.9*	*81.9*	*9.3*	
Iron	100		*42200*	*42900*	*1.6*	
Lead	5		*20.9*	*21.5*	*2.8*	
Magnesium	5000		*7460*	*7900*	*5.7*	
Manganese	15		*741*	*754*	*1.7*	
Mercury	0.2					
Nickel	40		*27.1*	*15.0*	*57.5*	
Potassium	5000		*5470*	*5990*	*9.1*	
Selenium	5					
Silver	10					
Sodium	5000		*8920*	*9700*	*8.4*	
Thallium	10					
Vanadium	50		*22.1*	*18.2*	*19.4*	
Zinc	20		*187*	*180*	*3.8*	
Cyanide	10					

Field Duplicate Actions should be applied to all other samples of the same matrix type.

ACTIONS: *None; all criteria were met.*

1. Estimate (J) positive results for elements which have an RPD >30% for water samples and >50% for soil samples, when sample results are >5xCRDL.
2. If sample results are less than 5xCRDL, estimate (J) positive results for elements whose absolute difference is >2xCRDL (4xCRDL for soil samples). If both samples are non-detected, the RPD is not calculated (NC).

REGION I
Data Review Worksheet

IX. LABORATORY CONTROL SAMPLE

1. Aqueous LCS

List any LCS recoveries not within the 80-120% criteria and the samples affected.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED

2. Solid LCS *N/A.*

List any analytes that were not within the control windows set by the EPA for the solid LCS sample. The 80-120% criteria is not used evaluate solid LCS results.

ELEMENT	LCS CONC.	CONTROL WINDOWS	ACTION	SAMPLES AFFECTED

ACTIONS: *None; all criteria were met.*

Aqueous LCS:

%R	Positive results	Nondetected results
<50%	R	R
50-79%	J	UJ
>120%	J	

Solid LCS:

	Positive results	Nondetected results
<EPA Control Windows	J	UJ
>EPA Control Windows	J	

3. Frequency Criteria

A. Was an LCS analyzed for every matrix, every digestion batch, and every 20 samples?

Yes

REGION I
Data Review Worksheet

X A. FURNACE ATOMIC ABSORPTION ANALYSIS

1. Duplicate Precision: *N/A - TIER II validation*

_____ Duplicate injections and one-point analytical spikes were performed for all samples: duplicate injections agreed within ±20%.

_____ Duplicate injections and/or spikes were not performed for the following samples/elements: _____

_____

_____ Duplicate injections did not agree within ±20% for samples/elements: _____

_____

2. Post Digestion Spike Recoveries

_____ Spike recoveries met the 85-115% recovery criteria for all samples.

__✓__ Spike recoveries did not meet the 85-115% criteria but did not require MSA for the following samples/elements: *Se: MACZ52(58%), MACZ46(60%), MACZ50(32.5%); Tl: MACZ46(63.5%), MACZ47(77%), MACZ49(64%), MACZ50(82.5%), MACZ51(74.0%), MACZ52(120.5%); As: MACZ48(118.8%), MACZ49(134.5%), MACZ52(84%).*

__✓__ Method of Standard Addition (MSA) was used to quantitate analytical results when contractually required.

__✓__ Correlation coefficients ≥0.995; accept results.

_____ Correlation coefficients <0.995 for samples numbers/elements:

_____

_____ MSA was not performed as required for samples/elements: _____

ACTIONS: *The following actions were taken: As: J(+) in MACZ48, MACZ49; As: J(+);UJ(ND) in MACZ52; Se: J(+);UJ(ND) in MACZ46, MACZ50, MACZ52; Tl: J(+);UJ(ND) in MACZ46, MACZ47, MACZ49, MACZ50, MACZ51; Tl: J(+) in MACZ52.*

1. Estimated (J) positive results if duplicate injections are outside ±20% RSD or CV.

2. If post digestion spike recovery is <40%, qualify positive results as estimated (J) and non-detects as estimated (UJ). If post digestion spike recovery is <10%, qualify positive results as estimated (J) and non-detects as unusable (R).

3. If the sample absorbance is <50% of post digestion spike absorbance, the following actions should be applied:

%R	Positive results	Nondetected results
<85%	J	UJ
>115%	J	UJ

4. Estimate (J) samples results if MSA was required and not performed or is correlation coefficient was <0.995.

REGION I
Data Review Worksheet

XI. ICP SERIAL DILUTION ANALYSIS

_____ Serial dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis for analyte concentrations greater than 50x the IDL before dilution.

_____ Serial dilutions were not performed for the following: _____

__✓__ Serial dilutions were performed, but analytical results did not agree within 10% for analyte concentrations greater than 50x the IDL before dilution.

Report all results below that do not meet the required laboratory criteria for ICP serial dilution analysis.

MATRIX: *water*

ELEMENT	IDL	5OxIDL	SAMPLE RESULT	SERIAL DILUTION	%D	ACTION
Aluminum						
Barium						
Beryllium						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Magnesium						
Manganese						
Nickel						
Potassium						
Silver						
Sodium	*204.0*	*10200*	*14653.00*	*11512.00*	*21.4*	*J(+)*
Vanadium						
Zinc						

Actions apply to all samples of the same matrix.

ACTIONS: *See Action column above.*
1. Estimated (J) positive results if %D >10%.

REGION I
Data Review Worksheet

XII. DETECTION LIMIT RESULTS

1. Instrument Detection Limits (IDLs)

___✓___ IDL results were present and found to be less than the CRDLs.

_____ IDLs were not included in the data package on Form 10.

_____ IDLs were present, but the criteria was not met for the following elements: _____

_____

2. Reporting Requirements

Yes Were sample results on Form 1 reported down to the IDL and not the CRDL for all analytes?

N/A Were samples results that were analyzed by ICP for As, Pb, Se, or Tl at least 5x the IDL?

Yes Were sample weights, volumes, and dilutions taken into account when reporting detection limits on Form 1?

If not, the reported results may be inaccurate. Make the necessary changes on the data summary tables and request that the laboratory resubmit the corrected data.

XIII. SAMPLE QUANTITATION

___✓___ Samples results fall within the linear range for ICP and within the calibrated range for all other parameters.

_____ Samples results were beyond the linear range/calibration range of the instrument for the following samples/elements: _____

TABLE A Page 1 of 1
CIBA-GEIGY
08/24/93
CLP INORGANIC ANALYSIS
CASE NO. 20682, SDG NO. MACZ46
GROUNDWATER ANALYTICAL RESULTS (UG/L)

Sample Location			MW-11D	MW-26S	MW-26S(2)	MW-35S	MW-32S	MW-25S	Field Blank	Perform. Eval.	Perform. Eval.			
Sample Number			MACZ46	MACZ47	MACZ48	MACZ49	MACZ50	MACZ51	MACZ52	MACZ53	MACZ55			
Traffic Report Number			MACZ46	MACZ47	MACZ48	MACZ49	MACZ50	MACZ51	MACZ52	MACZ53	MACZ55			
Date Sampled			08/24/93	08/24/93	08/24/93	08/24/93	08/24/93	08/24/93	08/24/93	08/24/93	08/24/93			
Date Analyzed			09/26/93	09/26/93	09/26/93	09/26/93	09/26/93	09/26/93	09/26/93	09/26/93	09/26/93			
Dilution Factor			Se = 10	Se = 10	Se = 10	Se = 10	Se = 10	Se = 10		As = 2				
Remarks					field dup.				field blank					
INORGANIC ELEMENTS		Detection Limits												
Aluminum	P	56	1650 J	18500 J	19900 J	849 J	20600 J	10400 J		99700	NR			
Antimony	P	36.0									NR			
Arsenic	F	5.0	10.6	16.8	11.7 J		15.8	24.0	UJ	109	NR			
Barium	P	15.0		50.0	50.0		231	70.1			NR			
Beryllium	P	2.0	UJ	UJ	UJ	UJ	UJ	UJ	UJ		NR			
Cadmium	P	3.0									NR			
Calcium	O	357	44400	18800	20200	35900	20400	21100		4400	NR			
Chromium	P	6.0		28.2 U	24.9 U		46.7	20.2 U			NR			
Cobalt	P	8.0		12.2	9.9		25.0			730	NR			
Copper	P	11.0		89.9 U	81.9 U		65.3 U	35.8 U		31.9	NR			
Iron	P	18.0	2610 J	42200 J	42900 J	1860 J	58400 J	27700 J		2640	NR			
Lead	P	19.0	10.4	20.9	21.5	4.2	21.9	10			NR			
Magnesium	P	185	6800	7460	7900	5630	9350	7240		96000	NR			
Manganese	P	7.0	385	741	754	130	5270	2510			NR			
Mercury	CV	0.20									NR			
Nickel	P	12.0		27.1	15.0		34.2			72.0	NR			
Potassium	P	380	3370	5470	5990	2630	8150	5750		6520	NR			
Selenium	F	2.0	UJ				UJ		UJ		NR			
Silver	P	6.0	UJ	UJ	UJ	UJ	UJ	UJ	UJ		NR			
Sodium	P	204	15100 J	8920 J	9700 J	14700 J	19000 J	15400 J		6680	NR			
Thallium	F	3.0	UJ	UJ		UJ	UJ	UJ		15.8	NR			
Vanadium	P	12.0		22.1	18.2		13.7				NR			
Zinc	P	4.0	39.2	187	180	5.5 U	125	51.5		821	NR			
Cyanide	C	10.0								NR	358			

Analytical Method
F Furnace
P ICP/Flame AA
CV Cold-Vapor
C Colorimetric

NOTE: A blank space indicates the element was not detected.
J Quantitation is approximate due to limitations identified during the quality control review.
R Value is rejected.
U Revised Sample Quantitation Limit
UJ Sample Quantitation Limit is approximate due to limitations identified during the quality control review.
NA Not analyzed.